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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/777,162      | 02/13/2004  | Matthias Slodowski   | 064192-0107         | 5100             |

22428 7590 06/13/2007  
FOLEY AND LARDNER LLP  
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EXAMINER

STOCK JR, GORDON J

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2877

|           |               |
|-----------|---------------|
| MAIL DATE | DELIVERY MODE |
|-----------|---------------|

06/13/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/777,162

Applicant(s)

SLODOWSKI, MATTHIAS

Examiner

Gordon J. Stock

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-13 and 16-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-13 and 16-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. The Amendment received on March 19, 2007 has been entered into the record.

#### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-2, 6 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Birkner et al. (2002/0051698)**—previously cited in view of **Sandland et al. (4,618,938)** and **Ohtombe et al. (4,764,969)**.

As for **claim 1**, Birkner in a substrate conveying module discloses the following: at least one cassette element (Fig. 7: 2a-2d) with a transport mechanism provided between the cassette element for the wafers and the two workstations (Fig. 7: 1a, 1b); wherein, the two workstations (Fig. 7: 3) may be a thin-layer micrometrology system and a thin-layer macrometrology system (paragraph 0005); wherein the measurement stations are positioned in a region of the transport mechanism (paragraph 0039) one measurement station is respectively after the cassette element and before the other measurement station (Fig. 7: 2a-2d with both 3's). As for 'such that the semiconductor substrates are transported from the cassette element beneath the measurement unit for thin-layer macrometrology to the first measurement unit for thin-layer micrometrology; wherein the measurement unit for thin layer macrometrology is configured such that an image of an entire surface of the substrate is acquired' Birkner does not explicitly state this order of

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transportation in the system and only states that cameras may be used (paragraph 0053).

However, Sandland in a method and apparatus for automatic wafer inspection teaches transferring the wafers from cassettes beneath a macro inspection to a microinspection system (Fig. 2: 12, 24, 42, 44; Fig. 3: macroposition to microposition). And Ohtombe in an inspection system teaches that an entire image of the substrate is obtained by the macroinspection device prior to transport to the microinspection station (Fig. 2; col. 2, lines 50-67; col. 3, lines 1-20). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the substrates moved from the macrometrology system to the micrometrology system in order to determine if defects in the macroinspection are true defects. And it would be obvious to one of ordinary skill in the art at the time the invention was made to have the macrometrology station be configured so that an image of the entire surface of the substrate is acquired in order to determine the defect profile of the substrate surface.

As for **claim 2**, Birkner in view of Sandland and Ohtombe discloses everything as above (see **claim 1**). In addition, Birkner discloses one workstation being enclosed by a housing defining a basal area (Fig. 9: basal area of region 3).

As for **claim 6**, Birkner in view of Sandland and Ohtombe discloses everything as above (see **claim 1**). In addition, Birkner discloses a macrophotometer, an electronic camera (paragraph 0005).

As for **claim 9**, Birkner in view of Sandland and Ohtombe discloses everything as above (see **claim 1**). In addition, Birkner discloses wafers (paragraphs 0002-0003).

4. **Claims 3, 7, and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Birkner et al. (2002/0051698)—previously cited** in view of **Sandland et al. (4,618,938)** and

further in view of **Ohtombe et al. (4,764,969)** and further in view of **Birkner et al. (2002/0095999)**—previously cited.

As for **claim 3**, Birkner in view of Sandland and Ohtombe discloses everything as above (see **claim 1**). In addition, Birkner '698 discloses the workstations in housing with a basal area (Fig. 9). However, Birkner '698 does not state that the housing is arranged such that the basal area is no larger than a basal area of the apparatus for thin-layer apparatus that contains only a measurement unit for thin-layer micrometrology. However, Birkner '999 teaches having a basal area for three workstations and only one is a microscopic inspection station (Fig. 1: 18). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the basal area be no larger than a basal area for an apparatus for thin-layer metrology that contains only a measurement unit for thin-layer micrometrology to have a more compact system.

As for **claim 7**, Birkner in view of Nikoonahad discloses everything as above (see **claim 1**). Birkner '698 is silent concerning a feeder. However, Birkner '999 discloses a feeder for transport between a cassette and workstation (Fig. 1: 1). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a feeder in order to feed the substrate from the cassette to the workstation for inspection.

As for **claim 8**, Birkner '698 in view of Sandland and Ohtombe and Birkner '999 discloses everything as above (see **claim 7**). In addition, in view of Birkner '999 the substrates are pullable with the feeder out of the cassette element for delivery into the measurement unit (Fig. 1: 1). And Birkner '698 discloses automated inspection (paragraph 0005). In view of Sandland and Ohtombe it is taught that the substrates are guidable beneath the measurement unit

for thin-layer macrometrology (Sandland: Fig. 3: macroinspection to microinspection; Ohtombe: col. 3, lines 5-10).

5. **Claims 10-13, 16, 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Birkner et al. (2002/0051698)**-previously cited in view of **Applicant's Disclosure of Prior Art** and further in view of **Sandland et al. (4,618,938)** and **Ohtombe et al. (4,764,969)**

As for **claim 10**, Birkner discloses transferring semiconductor substrates (paragraphs 0002-0003) out of at least one cassette (Fig. 7: 1a, 1c, 2a-2d) to a measurement unit of thin-layer micrometrology (Fig. 7: 3); being guided along past a measurement unit for thin-layer macrometrology (paragraph 0005; Fig. 7: two workstations, 3); using a transport mechanism provided between the cassette element and the measurement unit for thin-layer micrometrology (Fig. 7: 2a-2d, 1, 3); determining locations for inspection automatically (paragraph 0005, lines 20-22) with a computer (Fig. 7: 6); wherein, two workstations may be micro and macroinspect (paragraph 0005). Birkner is silent concerning having the macroinspection workstation determining locations for micrometrology instrument to inspect and having the micrometrology performing measurements there. However, applicant's disclosure of prior art teaches that the macroinspection station determines where the microinspection should inspect the wafer (page 2, lines 20-25). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the macroinspection system determine positions of defects in order for the microinspection system to thoroughly inspect the defective areas.

As for transferring the substrates past the macrometrology unit during transport to the measurement unit for thin layer micrometrology and acquiring an image of an entire surface of the semiconductor substrates in the macrometrology measurement unit, determining locations of

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measurements via the acquired image, and adjusting the micrometrology unit to the identified measurement locations and performing a detailed measurement of the defects with the micrometrology unit, Birkner is silent. He does state that cameras may be used (paragraph 0053).

However, Sandland in a method and apparatus for automatic wafer inspection teaches transferring the wafers from cassettes beneath a macro inspection to a microinspection system (Fig. 2: 12, 24, 42, 44; Fig. 3: macroposition to microposition). And Ohtombe in an inspection system teaches that an entire image of the substrate is obtained by the macroinspection device prior to transport to the microinspection station; wherein, locations from the acquired image are determined and the micrometrology unit is adjusted to these determined locations to perform detailed defect measurements (Fig. 2; col. 2, lines 50-67; col. 3, lines 1-30). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the substrates moved from the macrometrology system to the micrometrology system in order to determine if defects in the macroinspection are true defects. And it would be obvious to one of ordinary skill in the art at the time the invention was made to have the macrometrology station be configured so that an image of the entire surface of the substrate is acquired; determine locations from the image to adjust the micrometrology unit for detailed defect measurements in order to determine the defect profile of the substrate surface that excludes false positives and includes solely true defects.

As for **claim 11**, Birkner in view of applicant's disclosure of prior art, Sandland, and Ohtombe discloses everything as above (see **claim 10**). In addition, Birkner discloses automated locations for measurements transferal (paragraph 0005, lines 20-22). In view of applicant's

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disclosure of prior art the macrometrology system inspects the surface and defects found are preselected locations for the micrometrology systems (page 2, lines 20-25).

As for **claim 12**, Birkner in view of applicant's disclosure of prior art, Sandland, and Ohtombe discloses everything as above (see **claim 10**). In addition, Birkner discloses multiple substrates may be inspected simultaneously (Fig. 7: two workstations, 3 and four cassettes of substrates, 2a-2d).

As for **claim 13**, Birkner in view of applicant's disclosure of prior art, Sandland, and Ohtombe discloses everything as above (see **claim 10**). In addition, in view of applicant's disclosure of prior art the macrometrology system determines locations for measurement by the micrometrology system with measured values, thresholds defined as types of defects, as a decision as to whether microscopic points are to be measured by the micrometrology system (page 2, lines 20-25).

As for **claim 16**, Birkner in view of applicant's disclosure of prior art, Sandland, and Ohtombe discloses everything as above (see **claim 10**). In addition, Birkner discloses a macrophotometer, an electronic camera (paragraph 0005).

As for **claim 18**, Birkner in view of applicant's disclosure of prior art, Sandland, and Ohtombe discloses everything as above (see **claim 10**). Birkner and applicant's disclosure of prior do not specifically state using a coordinate transformation. However, applicant's disclosure of prior art teaches that defects by macroinspection are used for microinspection (page 2, lines 24-25) and Birkner discloses automation of locations for inspection (paragraph 0005, lines 20-22). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have coordinate transformation of the defects found in macroinspection in

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order to determine the locations in the micrometrology system's coordinate system for inspection.

6. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Birkner et al. (2002/0051698)**—**previously cited** in view of applicant's disclosure of prior art further in view of **Nikoonahad et al. (6,919,957)** and further in view of **Birkner et al. (2002/0095999)**—**previously cited**.

As for **claim 17**, Birkner in view of applicant's disclosure of prior art and Nikoonahad discloses everything as above (see **claim 10**). In addition, Birkner discloses a transport mechanism (Fig. 7: 1a and 1c). Birkner '698 is silent concerning a feeder. However, Birkner '999 discloses a feeder for transport between a cassette and workstation (Fig. 1: 1). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a feeder in order to feed the substrate from the cassette to the workstation for inspection.

7. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Birkner et al. (2002/0051698)**—**previously cited** in view of **Sandland et al. (4,618,938)** and **Ohtombe et al. (4,764,969)** further in view of **Nikoonahad et al. (6,919,957)**—**previously cited**.

As for **claim 19**, Birkner in view of Sandland and Ohtombe discloses everything as above (see **claim 1**). However, Birkner is silent concerning the first measurement unit for thin-layer micrometrology comprises a combination of a microphotometer and a microellipsometer. However, Nikoonahad in a system for determining presence of defects teaches that a micrometrology unit may comprise a microphotometer and a microellipsometer (col. 53, lines 10-20; col. 86, lines 1-20 with lines 55-65; col. 78, lines 44-60). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the micrometrology

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unit comprise a microphotometer such as a spectroscopic reflectometer and a microellipsometer such as spectroscopic ellipsometer in order to determine several types of defects on a wafer to gather a more accurate profile of the wafer that is being inspected.

8. **Claim 20** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Birkner et al. (2002/0051698)**—previously cited in view of **Applicant's Disclosure of Prior Art** and further in view of **Sandland et al. (4,618,938)** and **Ohtombe et al. (4,764,969)** further in view of **Nikoonahad et al. (6,919,957)**—previously cited.

As for **claim 20**, Birkner in view of applicant's disclosure of prior art, Sandland, and Ohtombe discloses everything as above (see **claim 10**). However, Birkner is silent concerning the first measurement unit for thin-layer micrometrology comprises a combination of a microphotometer and a microellipsometer. However, Nikoonahad in a system for determining presence of defects teaches that a micrometrology unit may comprise a microphotometer and a microellipsometer (col. 53, lines 10-20; col. 86, lines 1-20 with lines 55-65; col. 78, lines 44-60). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the micrometrology unit comprise a microphotometer such as a spectroscopic reflectometer and a microellipsometer such as spectroscopic ellipsometer in order to determine several types of defects on a wafer to gather a more accurate profile of the wafer that is being inspected.

#### ***Response to Arguments***

9. Applicant's remarks with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

*Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure: U.S. Patent 6,178,257 to Alumot et al.

U.S. Patent 6,208,751 to Almogy

US 2002/0176074 to Hasan

US 2003/0140716 to Birkner et al.

US 2004/0029333 to Matsukawa

US 2005/0038554 to Watkins

U.S. Patent 7,173,693 to Shibata et al.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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***Fax/Telephone Numbers***

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

*Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (571) 273-8300*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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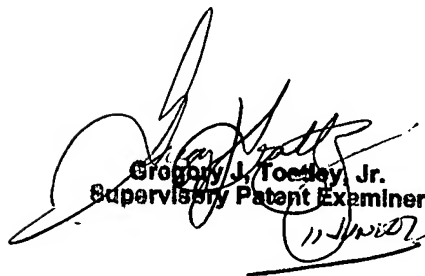
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YD  
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June 6, 2007

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11 June 07